
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Hao et al.

Attorney Docket No.: LAM1P132C1

Application No.: 10/040,326

Examiner: Alejandro Mulero, L.

Filed: January 3, 2002

Group: 1763

Title: LOWER ELECTRODE DESIGN FOR
HIGHER UNIFORMITY

Confirmation No.: 3569

PRE APPEAL BRIEF REQUEST FOR REVIEW

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicant hereby requests review of the rejections in the above-identified patent application. This request is being filed with a Notice of Appeal. Review is requested for the reasons stated in the accompanying remarks.

STATUS OF CLAIMS

All claims pending in the application have been finally rejected and are on appeal including claims 22-23, 25, 27-32, 34-37, 39, 41-45, 47, 49, 51, 52, 54, 55, 60, 61, 63, and 65-68.

Claims 22, 34 and 49 are independent claims and can be clearly distinguished from the four cited references: Masuda et al. 6,171,438; Wicker et al. 6,129,808; Tamura et al. 5,792,304 and Ohmi et al. WO98/39500 (U.S. Patent No. 6,585,851).

For purposes of this Review, only independent claims 22, 34 and 49 need be considered. Patentability of these claims necessarily lends patentability for all claims depending therefrom.

The present application is a continuation of parent application serial number 09/475,824, now U.S. Patent No. 6,363,882 with claims drawn to a plasma processing system. The claims of the present application are drawn to the pedestal for supporting a substrate during processing in the plasma processing system of the 6,363,882 patent.

The prior art rejections in the Final Rejection are the same as the rejections given in the Office Action dated October 18, 2005, and the arguments for traversing the Final Rejection are set forth in more detail in the Amendment and Response dated January 25, 2006.

CLAIMED SUBJECT MATTER

The claimed subject matter is described in the Summary of the Invention on pages 3 and 4, and more particularly on page 8, lines 22-32, which describe, with respect to Fig. 3, a uniformity pedestal 132 including an electrode 152, a chuck 154, a substrate 160 held by chuck 154, an edge ring 156, and an impedance matching layer 158, all of which are recited in independent claims 22 and 34. Independent claim 49 for a uniformity mechanism, recites all elements except for the electrode.

The edge ring 156 is described in structure and function on page 10, lines 1-31, and the impedance matching layer 158 is described in structure and function on page 10, line 32 through page 12, line 28. As described, the configuration of the edge ring and impedance matching layer are important in realizing the high degree in processing uniformity across the surface of a substrate.

The configurations, especially of the planar edge ring and impedance matching layer, are specifically called out in independent claims 22, 34 and 49 and are not believed to be shown or suggested by the references, either singly or combined, as discussed herein below and in more detail in the Amendment and Response dated January 25, 2006.

CLAIMS 22 AND 49 ARE IN COMPLIANCE WITH 35 USC 112, 1st AND 2nd PARAGRAPHS

Claim 22 specifies, in part, a pedestal for supporting a substrate during plasma processing and comprising:

- an electrode configured for generating an electric field;
- a chuck disposed above said electrode, said chuck being configured for holding said substrate;
- a generally planar edge ring disposed above said electrode and extending underneath a substrate when positioned on said chuck,

Contrary to the allegation of indefiniteness by the Examiner, it is believed that the claim is definite in specifying a chuck configured for holding a substrate, and a generally planar edge ring extending underneath a substrate when positioned on the chuck. It is believed that the claim is definite in specifying, when read in context, that the substrate is positioned on the chuck and not the planar edge ring as contended by the Examiner. The same language can be found in claim 49, and it is believed that claim 49 is in compliance with 35 USC 112 also.

THE CITED REFERENCES, SINGLY OR COMBINED, DO NOT SHOW OR SUGGEST THE PEDESTAL OF CLAIMS 22 AND 34 OR THE UNIFORMITY MECHANISM OF CLAIM 49

None of the references discloses the recited planar edge ring extending underneath a substrate when positioned on the chuck with inner edge portions proximate an edge of the substrate and an edge of

the chuck and an outer edge portion extending to one edge of the electrode; and an impedance matching layer disposed and confined between the electrode and the edge ring and underneath the substrate when the substrate is resting on the pedestal, the impedance matching layer being entirely planar and parallel with a top surface of the electrode and a bottom surface of the edge ring (claim 22). Claims 34 and 49 include similar recitations for the edge ring and for the impedance matching layer.

CLAIMS 22 AND 49 ARE PATENTABLE OVER MASUDA ET AL. UNDER 35 USC 102(b)

Masuda et al. 6,171,438 discloses in Fig. 2 a chuck 131 for holding a wafer W, with a sample holder ring 133 over an insulator 132, with a heat transfer gas provided in a chamber 136a between the ring and insulator. Note that the numerals 132 and 133 are reversed in Fig. 1.

Insulator 132 is not confined between the electrode and edge ring and underneath the substrate when the substrate is resting on the pedestal, with the impedance matching layer being entirely planar and parallel with a top surface of the electrode and a bottom surface of the edge ring; rather, insulator 132 in Fig. 2 is recessed to define the cavity 136a for transfer gas. Moreover, insulation 133 envelopes the electrostatic chucking device 131 and is not confined between the electrode and the edge ring as claimed.

CLAIMS 22 AND 49 ARE PATENTABLE OVER WICKER ET AL. UNDER 35 USC 102(b)

Wicker et al. 6,129,808 discloses a plasma etch chamber including a pedestal 112 enveloping a chuck 106 in which a substrate 104 is mounted and with a focus ring 114 mounted on the chuck and around substrate 104. The Examiner refers to pedestal 112 as an impedance matching layer; however, pedestal 112 envelopes chuck 106 and electrode 108 and is not confined between the electrode and the edge ring underneath the substrate as defined by the claims. In this respect, Wicker is similar to the Masuda et al. structure in which the insulator 132 envelopes the chuck and is not confined between the electrode and edge ring. The claimed impedance matching layer and the insulator of Wicker are different in structure and in function in their respective plasma etchers.

CLAIMS 22, 34 AND 49 ARE PATENTABLE OVER TAMURA ET AL. IN VIEW OF OHMI ET AL. UNDER 35 USC 103(a)

Tamura et al. 5,792,304 discloses a substrate holding system and as shown in fig. 9 a substrate 1 is held by a chuck above electrode 2 with a susceptor cover 36 for holding member 2, (column 15, lines 1-9). Clearly, susceptor 36 is not a generally planar edge ring disposed above the electrode, but rather is a cover for the dielectric material and holding member 2 and functions to “uniform the gas flow for substrate etching to be uniform”. Further, the Examiner recognizes that Tamura et al. do not disclose the recited impedance matching layer between the electrode and edge ring, the Examiner referring to the cited Ohmi et al. as including an impedance matching layer. However, there is no suggestion in Tamura et al. for including an impedance matching layer with their electrically insulating cover 36, and the use of an insulator by Ohmi et al. with their electrode 103 would not appear to be useful in the cover 36 of Tamura

et al. In any event, the pedestal as now claimed would not result therefrom assuming arguendo that Tamura and Ohmi could be combined.

Ohmi et al. WO98/39500 (U.S. Patent No. 6,585,851) discloses a plasma etching device including in Fig. 1 a local electrode 103 which the Examiner construes to be an edge ring, however it is noted that the electrode 103 does not extend underneath the substrate 108 positioned on a base of electrode 101, nor does electrode 103 proximately abut an edge of the substrate and an edge of the chuck as claimed. It is clear that Ohmi does not provide the protection for the chuck and electrode as does the claimed pedestal. Note that electrode 103 is positioned on impedance matching layer 104 which does not extend underneath the substrate when the substrate is resting on the pedestal 101a.

CLAIM 34 IS PATENTABLE OVER MASUDA ET AL. UNDER 35 USC 103(a)

Claim 34 is identical to claim 22 in defining the edge ring and the impedance matching layer of the claimed pedestal. As noted above with respect to claim 22, Masuda et al. do not disclose or suggest the edge ring extending under a substrate or an impedance matching layer disposed and confined between the electrode and edge ring and underneath the substrate.

CLAIM 34 IS PATENTABLE OVER WICKER ET AL. UNDER 35 USC 103(a)

Again, claim 34 is identical to claim 22 in defining the edge ring and the impedance matching layer of the claimed pedestal. As noted above, Wicker et al. pedestal 112, which the Examiner refers to as an impedance matching layer, envelopes chuck 106 and electrode 108 and is not confined between the electrode 108 and edge ring underneath the substrate as defined by claim 34.

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Dependent claims have been rejected under 35 USC 103(a) on various combinations of the cited prior art, but for purposes of this review these rejections are not addressed since the parent independent claims are believed to patentably distinguish the references, as noted above.

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It is respectfully submitted that independent claims 22 and 49 are not fully met by Masuda et al or Wicker et al. as alleged by the Examiner. It is respectfully submitted that independent claims 22, 34, and 49 are not obvious from Tamura taken with Ohmi as alleged by the Examiner. It is respectfully believed that claim 34 is not obvious from either Masuda or from Wicker, as alleged by the Examiner.

It is respectfully requested that the Final Rejections of independent claims 22, 34 and 49 be reversed along with the Final Rejection of all claims depending therefrom.

Respectfully submitted,
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